

## CLAIMS

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1. A method for loop optimization within a dynamic compiler system,  
comprising:

5 creating a pre-loop structure based on an original loop structure, wherein the pre-  
loop structure is capable of testing indexing expressions for underflow;

generating a main loop structure having indexing expressions based on the  
original loop structure, wherein the indexing expressions cannot produce an underflow,  
and wherein the indexing expressions cannot produce an overflow; and

10 creating a post-loop structure based on the original loop structure, wherein the  
post-loop structure is capable of testing indexing expressions for overflow.

2. A method as recited in claim 1, wherein the pre-loop structure includes an  
array boundary test.

15 3. A method as recited in claim 2, wherein the post-loop structure includes an  
array boundary test.

4. A method as recited in claim 3, wherein the main loop structure does not  
include an array boundary test.

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5. A method as recited in claim 1, further including the operation of compiling a computer program during execution of the computer program.

5 6. A method as recited in claim 5, further including the operation of interpreting lines of the computer program during execution of the computer program.

7. A method for loop optimization within a dynamic compiler system, comprising:

10 executing a computer program having an original loop structure;

compiling the original loop structure during the execution of the computer program; and

15 creating a range check elimination loop structure based on the original loop structure during the compiling operation, wherein the range check elimination loop structure includes a pre-loop structure, a main loop structure, and a post-loop structure.

8. A method as recited in claim 7, wherein the pre-loop structure is capable of testing indexing expressions for underflow.

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9. A method as recited in claim 8, wherein the main loop structure, wherein indexing expressions included in the main loop structure cannot produce an underflow, and wherein the indexing expressions cannot produce an overflow.
- 5 10. A method as recited in claim 9, wherein the post-loop structure is capable of testing indexing expressions for overflow.
11. A method as recited in claim 10, wherein the pre-loop structure includes an array boundary test.
- 10 12. A method as recited in claim 11, wherein the post-loop structure includes an array boundary test.
13. A method as recited in claim 12, wherein the main loop structure does not
- 15 include an array boundary test.
14. A method as recited in claim 13, further including the operation of interpreting lines of the computer program during execution of the computer program.

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15. A range check elimination loop structure, comprising:

a pre-loop structure based on an original loop structure, the pre-loop structure capable of testing indexing expressions for underflow;

5 a main loop structure having indexing expressions based on the original loop structure, wherein the indexing expressions cannot produce an underflow, and wherein the indexing expressions cannot produce an overflow; and

a post-loop structure based on the original loop structure, wherein the post-loop structure is capable of testing indexing expressions for overflow.

10 16. A range check elimination loop structure as recited in claim 15, wherein the pre-loop structure includes an array boundary test.

17. A range check elimination loop structure as recited in claim 16, wherein the post-loop structure includes an array boundary test.

15 18. A range check elimination loop structure as recited in claim 17, wherein the main loop structure does not include an array boundary test.

FIG. 2

19. ~~A range check elimination loop structure as recited in claim 15, wherein~~  
~~-loop structure, the main loop structure, and the post-loop structure, are generated~~  
~~dynamic compiler.~~

5           20.     A range check elimination loop structure as recited in claim 19, wherein  
the dynamic compiler generates the main loop structure, and the post-loop structure  
during execution of a computer program containing source code for the range check  
elimination loop structure.

[illegible]